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ABSTRACT

The facilitation observed when paired-associates (PA) are presented or generated in a meaningful string is a phenomenon that is well-documented, and raises a number of developmental issues. The principal objective of the current research was to examine the relationship between performance on an auditory PA task and the linguistic components of strings provided and generated by children from low-status-black and high-status-white groups. In addition, it was an attempt to bring sociolinguistic research closer to children's learning. Two hundred and sixteen sixth graders, comprising 108 low-status-black and 108 high-status-white subjects were aurally presented 36 pairs of concrete nouns. Linguistic strings generated in a free condition by low-status children facilitate recall for subjects like them, whereas high-status children's performance was facilitated by strings generated within both populations. Children from low-status-black and high-status-white populations learn noun-pairs more efficiently when nouns were embedded in subject generated and experimenter-provided verbal contexts than in a no-context control. A multiple regression analysis was carried out to assess the relationship between linguistic characteristics of the strings and noun-pair recall. (Author/JM)

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SUBJECT-GENERATED STRINGS AND NOUN-PAIR LEARNING: POPULATION COMPARISONS

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SUBJECT-GENERATED STRINGS AND NOUN-PAIR LEARNING: POPULATION COMPARISONS

Subject-generated strings and PA learning

ABSTRACT

Children from low-status-black and high-status-white populations learn noun-pairs more efficiently when nouns were embedded in subject generated and experimenter-provided verbal contexts than in a no-context control. The effects of linguistic strings on noun-pair learning was examined by varying the population source (i.e. low or high status) of the strings. Two hundred sixteen 6th graders, 108 low-status-black and 108 high-status-white Ss were aurally presented 36 pairs of concrete nouns. Linguistic strings generated in a free condition by low-status children facilitate recall for Ss like them, whereas high-status children's performance was facilitated by strings generated within both populations. A multiple regression analysis was carried out to assess the relationship between linguistic characteristics of the strings and noun-pair recall.

SUBJECT-GENERATED STRINGS AND NOUN-PAIR LEARNING: POPULATION COMPARISONS[1]

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The facilitation observed when paired-associates (PA) are presented or generated in a meaningful string is a phenomenon that is well-documented and raises a number of developmental issues (Rohwer, 1972). That is, the effect varies with learner characteristics (i.e. age, ethnic group, social status), origin of the mnemonic string (i.e. experimenter-provided, subject-generated), task characteristics (i.e. visual-verbal) and syntax (i.e. pairs linked with a verb, preposition conjunction).

Age and status variables have been manipulated in a number of studies (Fuld 1970; Guy, 1971; Rohwer and Bean, 1972; Rohwer, Lynch, Levin and Suzuki, 1968; Semler and Iscoe, 1963). The generalizations emerging from this research are: 1) Children's ability to learn PA's increase as a function of age. 2) Provided and generated sentential links are facilitating relative to no links. 3) A developmental interaction occurs during adolescence such that minimal links are as facilitating as maximal links. 4) Population comparisons reveal near equivalent performance for low-status-black and high-status-white Ss in pictorial stimulus presentations with differences favoring high-status-white children emerging in the aural mode only. The performance of children in an auditory PA task is of major interest here.

The principal objective of the current research was to examine the relationship between performance on an auditory PA task and the linguistic components of strings provided and generated by children from low-status-black and high-status-white groups. In addition it was an attempt to bring sociolinguistic research closer to children's learning.

Developmental questions have been investigated by presenting PA's in pictorial form to high-status-white Ss from kindergarten to twelfth grade with instructions to listen to the label or generate a sentence (Jensen and Rohwer, 1965). Sentence links were superior to the listen condition in grades 2, 4 and 6, but declined markedly in grades 8, 10 and 12. That is, performance for adolescents was equivalent in both conditions.

At the far end of the developmental range, college age adults perform much like high-status-white children. That is, there are no differences between the listen or "empty control" condition relative to a sentence generate or provide condition (Bower, 1970). Older children and adults appear to be spontaneously engaging in linking PA's. A control condition that effectively prevents adult Ss from constructing PA links is rehearsal (i.e. S is instructed to repeat the pairs in rate fashion).

However, there is a discrepancy regarding the generate versus provide condition. With adults, there is a mean difference between generate and provide, favoring the self-generated sentence. Findings with children indicate no difference between these conditions. (Bean and Rohwer, 1971) Various explanations have been offered for the adult-generate superiority. The most compelling explanation is a parsimonious one, such that engaging adult Ss in constructing a link enhances their comprehension, versus reading or listening withless comprehension (Bobrow and Bower, 1969). One strategy for illuminating the generate versus provide differences is to present a continuum of provided and generated sentence links for children. For example, an E would request that a child generate "anything" verbal he felt would aid in remembering the pairs (i.e. free generate) and/or one child's generated string would be provided to another like him in age and social status. In summary, the proposal is to present an array of linguistic constructions to children.

Verbal contexts generated by Ss may vary on at least three levels--semantic, syntactic and phonetic. One could assert that linguistic constructions generated

by children from different age and social status groups may differ on one or all of these levels. That is, at a semantic level, words may differ in meaning from group to group, and at a syntactic level, rules of sentence formation may differ such that strings generated by one group may be more or less comprehensible than those produced by another (Baratz, 1969).

The interesting question for children's PA learning is the source of the interaction between learner characteristics and type of link. One might argue that strings originating from high-status-white children would be less facilitating for low-status-black children and vice versa.

Sociolinguistic investigations of linguistic production and comprehension are few in number (Baratz, 1969; Cherry-Peisach, 1965; Osser, Wang and Zaid, 1969; Weener, 1969). Cherry-Peisach set out to evaluate the extent to which information is successfully communicated from teachers to pupils of various social background and the degree of effective communication among children from different social backgrounds. The child's comprehension was measured by his ability to replace a deleted word. The major finding of relevance to this study is that low-status-black children performed as well as middle-status-white children in replacing words deleted from passages which were obtained from low-status-black sources, but earned lower scores when the passages were obtained from middle-status-white speakers. The results indicate less comprehension for black children in this modified cloze task.

Utilizing a different task, (i.e. second and fourth degree approximation to English word order) Weener (1969) found that the performance of a middle-status-white group of children was sharply reduced by hearing a message presented by a speaker of the low-status group. This effect of speaker differences was not significant for the nonstandard dialect group. Low-status-black seven year-old children were able to recall as much of the middle-status-white speakers message as of the low-status speakers passage. One interpretation of these data is that low-status-black Ss are regularly exposed to two dialects. These children may in fact be

bidialectal. The expected interaction between the source of a message and the Ss dialect background did not materialize.

Baratz (1969) and Osser et al, (1969) assessed the speech imitation and speech comprehension abilities of black and white children. The Baratz results with third and fifth graders indicate that black children are not bidialectal on a sentence imitation task. Black children performed significantly better than white Ss on nonstandard dialect stimulus sentences. However, the converse was true for the standard sentences. Osser et al report white middle-status children's linguistic comprehension and production was superior to that of the low-status-black children even when differences in dialect and Standard English were taken into consideration. Thus, the question of bidialectalism remains an open question with linguistic performance varying as a function of the task and age of the child.

With regard to mode of PA presentation, pictorial materials facilitate learning for young children from a variety of ethinic-social status groups (Kee and Rohwer, 1972; Rohwer, Ammon, Suzuki and Levin, 1971). The pattern of facilitation holds up across high-status-white, low-status-black, Mexican-American and Chinese-American samples of first,second and third grade children. When PA's are presented auditorily, there are no status differences for young children (Rohwer and Bean, 1972). The visual-auditory difference occurs during adolescence (i.e. 6th to 11th graders).

In tracing down the parameters of the syntactic facilitation effect, Rohwer (1966) found the ease of learning nouns embedded in meaningful, grammatical word strings is a function of the form class connective linking Noun 1 (N_1) and Noun 2 (N_2). That is, performance improves when the nouns embedded in strings are linked by a verb rather than a preposition, and by a preposition rather than a conjunction. Palermo (1970) suggested that PA learning for individual Ss may be a function of a type of idiosyncratic generated linguistic string. Explanations for the form class phenomenon have lead to investigations of sentential variables and their

effects (Suzuki and Rohwer, 1968; Ehri and Rohwer, 1969).

Rohwer and Levin (1968) manipulated two levels of semantic meaningfulness in PA strings (normal and anomalous), as well as implied verbal activity. Action verbs did not lead to higher recall scores than nonaction verbs, and meaningful strings facilitated recall relative to those that were anomalous. A further refinement of the form class effect indicates that regardless of string type (meaningful phrases or sentences) superior performance is a function of a verb link between N_1 and N_2 (Suzuki and Rowher, 1968). What are the critical aspects of verbs that provide facilitation in PA recall? Ehri and Rohwer (1969) report results suggesting the nature of the verb's semantic relation with N_1 and N_2 is crucial. Subject related verbs enhance performance more than object related verbs, and two-unit verb-preposition connectives improve PA learning relative to one-unit verbs.

Summarizing, it appears that sentences improve recall only when there are appropriate syntactic and semantic contexts. The linguistic features increasing noun-pair recall are those triggering some type of relationship between N_1 and N_2.

In these previous studies, the sentence constructions were often provided by the E. Clearly, the S is less under the control of the E when instructions to generate a sentence or "anything" verbal are administered. The risk involved is that linguistic characteristics of generated strings may vary with age and social status such that the appropriate or facilitating features of provided strings may be absent. For example, if a young S generates a string, "The COW and BALL" one would predict he would recall fewer pairs than if he generates "THE COW chases the BALL" (Suzuki and Rohwer, 1968). However, the idiosyncratic aspect of the strings may cancel this effect.

The present study aims to continue the investigation of learner characteristics by looking at 1) the effect of status group origin of linguistic strings on the PA learning of children from low-status-black and high-status-white groups.

2) The reliability of the status difference across an array of provided and generated auditory conditions. 3) Linguistic components of strings generated by different children.

METHOD

Design and Materials. The design included nine conditions: Listen, Rehearsal, Standard Sentences, Free Generate, Sentence Generate, Free White, Free Black, Sentence White, Sentence Black. These last four were the provided conditions that were crossed. For example, a low-status-black S in the Free Black condition heard strings generated by a peer; if in the Free White, then S heard strings generated by a non-status peer.

Two analyses of variance were carried out. In the first, a 2 x 9 factorial, the effects of status (low-black vs. high white) and conditions were evaluated. This design allowed for a replication of the status difference. (Bean and Rohwer, 1971). In addition, comparisons between the generate conditions (Free and Sentence) could be made. The second analysis was a blocked design. The factors were: Source of Linguistic Strings (low-black vs. high-white); Type of String (Free vs. Sentence); Recipient of Strings (low-black vs. high-white) and the blocking variable, Sets of Strings (48 individual sets of thirty-six strings). A precise appraisal of the effect of population source of strings on performance would be made in this design.

A post-hoc multiple regression analysis was performed to assess the relationship between the linguistic characteristics of strings constructed in the Free and Sentence conditions and recall. An analysis of covariance was carried out on the adjusted means of the four provided conditions, with Conditions (Free vs. Sentence), status Recipient (low-black vs high-white) and status Origin (low-black vs high-white) as factors. An additional analysis of variance design assessed the frequencies of string categories nested within Conditions (Free or Sentence).

The learning materials consisted of 36 pairs of high frequency concrete nouns drawn from a pool used frequently in previous research (Bean and Rohwer, 1971). The experimental conditions were distinguished by variation in the type linquistic

string provided, generated and no linguistic context control. Examples of the linguistic strings generated and provided for each of the seven string conditions are presented in Table 1.

Insert Table 1 about here

In the Standard Sentence condition, the strings were simple active declarative sentences of the form N_1-Verb-N_2 with the PA's in subject and object position. Each S received one identical set of 36 strings.

In the generate conditions, Free and Sentence, each S from the low-status-black and high-status-white samples was asked to either "make-up anything" verbal that would aid memory or to "make-up a sentence." The set of strings generated by each subject was tape-recorded, transcribed and re-recorded by a white female E. These were the strings used in the Provided conditions (Free White, Free Black, Sentence White, Sentence Black). Each set of 36 strings in the Free and Sentence Generate condition could vary such that no one set would be identical. The noun pair could appear as subject-object, as direct object - object of the preposition and the like.

The generate comparisons would answer the question of sentence constraint. That is, if the S is free to generate anything verbally idiosyncratic, performance in the Free might be superior to the Sentence condition.

The comparison of the generate and provide conditions would address the issue of the relative facilitation of imposed vs. induced strings. Results with college age Ss consistently support the generate superior to provide condition (Bobrow and Bower, 1969; Duffy and Montague, 1971; Schwartz, 1971). This finding has not been replicated with younger Ss (Bean and Rohwer, 1971; Duffy and Montague, 1971).

In the string provided conditions (i.e. Free White, Free Black, Sentence White, Sentence Black), each S received a set of 36 constructions generated by a

S from either the low-status-black or high-status-white sample in the Free or Sentence Generate condition. No one set of strings was identical.

Two different controls were employed, one, a Listen (i.e. S heard the pairs), and Rehearsal, S vocalized the pairs. The Listen condition provided a performance baseline for string comparisons and allowed for the use of unvocalized strategies. Auditory rehearsal of PA's interferes with adolescent and adult recall relative to the Listen condition, but there is no difference for younger children (Rohwer and Bean, 1972; Bower and Winzenz, 1970). The control conditions were included to examine the Listen-Rehearsal discrepancy.

Scoring. The PA responses were scored using a strict criterion; an item was correct only if it was the response word. The sentences were categorized on a set of four criteria: 1) order of nouns in the string-generated N_1-N_2 or N_2-N_1; 2) relationship between N_1-N_2, Subject-verb-Object, Direct Object-Object of a Preposition, Compound Object; 3) miscellaneous category -- strings with either N_1 or N_2 used as a verb, phrases, conjoined strings, and the like; 4) activity-based verbs (i.e. jump, chase, build); 5) number of different constructions. There was a total of nine linguistic categories. Two judges categorized the strings. There was agreement on all but twenty strings out of 1728.

Subjects. The rationale for the selection of Ss from a low-status-black school district and a high-status-white school district was to trace down the source of the status difference found with auditory PA's. One-hundred and eight, sixth grade children from a school district serving low-status-black families and 108 Ss from high-status-white families were randomly assigned to one of nine conditions.

Procedure. The task was administered to each S individually by a white female experimenter. All materials were presented aurally by means of a Wollensak T-1500 audio taperecorder. After a S was seated in the experimental room, he received instructions appropriate for the condition to which he had been assigned. Next, a sample of four noun pairs was presented to illustrate the instructions and the procedure to be followed. A different random order of items was used on each of

two pairing and two test trials. A different random order of items was used on each trial. During the first pairing trial, the onset of every pair was signaled by a bell intended to terminate interitem activity and alert the S for the presentation of the next pair. The experimental manipulations pertained only to the initial pairing trial. On the remaining trial the procedure was identical across all four conditions, the rate of presentation was 4-sec. and the bell was deleted. The procedure followed during the test trials was the same for all conditions. The stimulus members of the pairs were presented at a 4-sec. rate and Ss task was to utter aloud the response member during the interitem interval.

RESULTS

The dependent variable was the number of correct responses per test trial. A summary of means as a function of Status, Condition and Trials is presented in Table 2.

Insert Table 2 about here

All of the contrasts relevant to the questions addressed by the study were evaluated by means of analysis of variance in which all tests were performed with $\alpha = .05$.

Status and Conditions. The status main effect was significant, F (1,198)= 42.00. There was an overall status difference, such that high-status-whites recalled more noun-pairs than low-status-blacks. This result confirms the reliability of the status contrast reported by Bean and Rohwer (1971). Of the eight *a priori* contrasts two were significant. The Generate and Provide conditions combined produced more learning than the Controls (i.e. Listen & Rehearsal). This result supports an axiomatic finding in PA learning. The contrast between the Generate (i.e. Free & Sentence) and Provide (Free White & Free Black & Sentence White & Sentence Black) conditions revealed that Generate conditions produce differential recall relative to Provide, F (1,198) = 4.96. This result is not consistent with

previous research on children's PA learning.

In tests for the interaction of Status x Condition, one contrast was significant. The provided conditions, Free Black and Sentence Black combined facilitated PA recall differentially for low-status-black and high-status-white Ss than Free White and Sentence White conditions combined, F (1,198) = 4.03. A more precise test and discussion of this interaction will be provided in the second analysis.

Provided Conditions. The blocked design analysis was performed on data from the four string-provided groups across both populations to assess the status source of strings hypothesis. The results pertinent to the second set of analyses are presented in Table 3 for the two population groups as a function of String Type, Status Origin, Status Recipient, and Sets of Strings.

Insert Table 3 about here

The main effect of String Type (Free, Sentence) was not significant F, (1,44) =< 1.00. Conceptually, this result supports the Free Generate vs. Sentence Generate equivalence in the first analysis.

The effect of Status Origin nested within String Type was not significant, such that no differences were evident, whether the strings originated from a low-status-black S or a high-status-white S in either the Free or Sentence condition. However, the effect of Status of Recipient nested within String Type was such that high-status Ss recalled more noun-pairs in the Free Provided conditions than low-status Ss, F, (1,44) = 20.59. This effect was replicated in the sentence Provided conditions F (1,44) = 23.69. These results were contrary to expectations; both status groups were receiving strings generated by status peers and non-status peers.

The Status Origin x Status Recipient interaction nested within the Free Type was significant F (1,44) = 7.30. This result clarifies the Status x Condition interaction of the first analysis. Low-status-black Ss recalled more noun-pairs when the linguistic strings originated from status peers than when strings originated

from non-status peers. This lends support to the prediction that low-status-black Ss would benefit more from a peer status set of strings than from a non-peer. This finding held for the Free Provided condition only. The Sentence Type interaction was not significant.

Post hoc analyses using Dunnett's Multiple Range Test revealed that in comparisons of the Standard Sentences with the Provide conditions, two reached significance. These occurred in the low-status-black group only. The critical value is 9.97. In both the Free and Sentence conditions, strings generated by high-status-white Ss produced poorer recall relative to the Standard Sentences. This finding may be accounted for by the heterogeneity of sets of strings in contrast with the identical set presented in Standard Sentences. Among high-status-white Ss, the source of strings did not produce significant effects.

Multiple Regression Analysis. The means for the linguistic categories as a function of Status and Conditions is provided in Table 4.

Insert Table 4 about here

The multivariate analysis was executed to assess the mean difference in occurrence of categories as a function of String Type (Free, Sentence), Status Origin of String, and Status Recipient of String. Within the main effect of String Type, (F (9,80) = 3.48), the Status difference in the Miscellaneous category was significant, F (1,88) = 15.87. Low-status-black Ss produced more Free type strings in this category than high-status-white Ss.

Within the Status Origin-Free condition effect (F (9,80) = 9.41), categories N_1-verb-N_2, N_2-verb-N_1 and Miscellaneous were significantly different F (1,88) = 18.33, F (1,88) = 7.78, F (1,88) = 52.10 respectively. The high-status-white Ss produced more Noun-verb-Noun constructions than low-status-black Ss. However, low-status-black Ss produced more Miscellaneous strings than high-status-white Ss.

In the Status Origin-Sentence condition effect (F (9,80) = 3.87), the category comparisons were identical to those above. These mean differences suggest a pattern of constructions between Status groups, with high-status-white Ss generating strings known to be facilitating in provided conditions.

An analysis of covariance was carried out on the Provide conditions; it replicated the results of the blocked analysis. An overall multiple regression correlation assessing the relationship between the nine linguistic categories and performance on Trial 1 and 2 was r = .34. In summary, there was no significant relationship between the learning score and nine predictors. Five of the nine predictors accounted for less than 1% of the learning variance.

DISCUSSION

The results of the present experiment indicate that low-status-black and high-status-white sixth grade children are facilitated by linguistic string conditions relative to control conditions.

The qualifications and implications of this statement relate to three concerns. One of these focuses on the comparative effects of an array of string manipulations; those strings generated within status groups and provided within and across status groups. The results indicate that children from low-status-black groups are facilitated more by strings from status peers. This finding is restricted to the Free Type (i.e. generate anything verbal, you think will help you remember the pairs). Such an outcome suggests that mediators generated by non-status peers are less effective. This interaction between Status Origin and Status Recipient did not materialize for the Sentence Type, but there is clearly a trend in mean performance. An examination of the linguistic category analysis indicates that low-status-black Ss generate more unique strings than high-status white Ss. One could argue that instructions to Free Generate are less constraining for one status group than for another. If this is the case, then it is not suprising that the strings are more heterogeneous relative to the Sentence Generate condition. The interesting question is why this should occur in one status group only. The multiple regression

on category analysis did not shed light on this question.

Somewhat at odds with this argument is the difference in the frequency of Noun-Verb-Noun constructions for high-status-white Ss. That is, more of these strings occur in the high-status group than low-status. What could be construed as the most facilitating linguistic construction (i.e. Noun-Verb-Noun) does not boost learning for low-status-blacks relative to heterogeneous strings generated by status peers. Although the method of classifying strings was global, it may be the case that for low-status Ss, strings generated by someone like S in age and status are more comprehensible on some unknown linguistic dimension. Socio-linguistic theory has little to contribute to this interpretation; research findings with standard and non-standard dialect are equivocal (Baratz 1969; Weener, 1969). One is led to wonder what the effects of a middle-status teacher's mediators are on low-status children in the classroom?

The second question asked by the experiment was the generate versus provide one. It seems apparent that high-status-white sixth graders perform much like college age adults (Bower, 1970). That is, actively engaging them in constructing a string provides more facilitation relative to providing them with one auditorily. This holds for the Free and Sentence conditons combined. This result is at odds with the Rohwer and Bean (1972) finding of no difference. The linguistic category analysis reveals that high-status-white Ss generate twice as many Noun-verb-Noun constructions as low-status-black Ss. The superiority of generate relative to provide does not occur in the low-status-black group.

With regard to the issue of the developmental interaction between status characteristics and the Listen and Rehearsal conditions, the interactions are not significant. The trend in means indicates that high-status-white children are initiating a strategy on their own. It appears as though low-status-black children are not. This observed trend matches previous findings (Bean and Rohwer, 1971; Guy, 1971; Rohwer and Bean, 1972). However, the performance of these two control

groups did not differ significantly in either status group. One implication of the finding is to teach children the adoption of a strategy approach to learning and memory. It is clear that an adolescent training study is the next step.

Generally, these findings suggest that future investigations focus on the effects of specific types of linguistic constructions, such that a list of modal strings produced within status groups be provided within and between these groups. One could trace down the source of the Status Origin x Status Recipient interaction by presenting a mixed list of modal constructions from both status groups, by speakers from both status groups. In addition semantic, syntactic and phonological variables can be systematically varied in auditory PA presentation.

Although this research has uncovered one source of individual differences in children's aural PA learning, the whole locus of children's linguistic facilitation is open.

References

Baratz, J.C. A bi-dialectal task for determining language proficiency in economically disadvantaged negro children. Child Development, 1969, 40, 889-901.

Bean, J. P. & Rohwer, W.D., Jr. Noun pair learning in adolescents: Population differences. Paper presented at the annual meeting of the American Educational Research Association, New York, February, 1971.

Bobrow, S.A. & Bower, G.H. Comprehension and recall of sentences. Journal of Experimental Psychology, 1969, 80, 455-461.

Bower, G.H. Mental imagery and associative learning. In L. Gregg (Ed.) Cognition in learning and memory. New York: Wiley, 1970.

Cherry-Peisach, E. Children's comprehension of teacher and peer speech. Child Development, 1965, 36, 467-480.

Duffy, T.M. and Montague, W.K. Sentence mnemonics and nounpair learning. Journal of Verbal Learning and Verbal Behavior, 1971, 10, 157-162.

Ehri, L.C. & Rohwer, W.D., Jr. Verb facilitation of paired-associate learning as a function of syntactic and semantic relations. Journal of Verbal Learning and Verbal Behavior, 1969, 8, 773-781.

Fuld, P.A. Syntactical mediation of paired-associate learning a function of age. Journal of Experimental Child Psychology, 1970, 10, 248-256.

Guy, K.C. Population differences in aural and pictorial-imaginal elaboration of a paired-associate list. Unpublished master's thesis. University of California, Berkeley, 1971.

Jensen, A.R. & Rohwer, W.D. Jr. Syntactical mediation of serial and paired-associate learning as a function of age. Child Development, 1965, 36, 601-608.

Kee, D.C. and Rohwer, W. D. Jr. Elaboration and learning efficiency in four ethnic groups. Paper presented at the annual meeting of the American Educational Research Association,Chicago, 1972.

Osser, H., Wang, M.D., & Zaid, F. The young child's ability to imitate and comprehend speech: A comparison of two subcultural groups. Child Development, 1969, 40, 1063-1075.

Palermo, D.S. Imagery in children's learning: Discussion Psychological Bulletin, 1970, 73, 415-422.

Rohwer, W.D., Jr. Constraint, syntax and meaning in paired-associate learning. Journal of Verbal Learning and Verbal Behavior, 1966, 5, 541-547.

Rohwer, W.D. Jr. Elaboration and learning in childhood and adolescence. in H. Reese (Ed) Advances in Child Development and Behavior. New York: Academic Press, 1972.

Rohwer, W.D., Jr. Ammon, M.S., Suzuki, N. & Levin, J.R. Population differences and learning proficiency. Journal of Educational Psychology, 1971, 62, 1-14.

Rohwer, W.D. Jr. and Bean J.P. Sentence effects and noun-pair learning; A developmental interaction during adolescence. Submitted for publication, 1972.

Rohwer, W.D., Jr. & Levin, J.R. Action, meaning, and stimulus selection in paired-associate learning. Journal of Verbal Learning and Verbal Behavior, 1968, 1, 137-284.

Rohwer, W.D., Jr., Lynch, S., Levin, J.R. & Suzuki, N. Grade level, school strata, and learning efficiency. Journal of Educational Psychology, 1968, 59, 26-31.

Schwartz, M. Subject-generated versus experimenter supplied mediators in paired-associate learning. Journal of Experimental Psychology, 1971, 87, 389-395.

Semler, I. & Iscoe, F. Comparative and developmental study of the learning abilities of Negro and White children under four conditions. Journal of Educational Psychology, 1963, 54, 38-44.

Suzuki, N., & Rohwer, W.D., Jr. Verbal facilitation of paired-associate learning: Type of grammatical unit vs. connective form class. Journal of Verbal Learning and Verbal Behavior, 1968, 7, 584-588.

Weener, P.D. Social dialect differences and the recall of verbal messages. Journal of Educational Psychology, 1969, 60, No. 3, 194-199.

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Table 1

Examples of Linguistic Strings Generated
and Provided for One Noun Pair (button-comb)

Strings Generated

Type	Black	White
Free:	The button caught hold to the comb	She sewed on a button as she combed her hair
Sentence:	I had a button in a comb	The button was on the comb

Strings Provided

Type	Black	White
Free Provide:	(Black) The button caught hold to the comb (White) She sewed a button as she combed her hair	The button caught hold to the comb She sewed a button as she combed her hair
Sentence Provide:	(Black) I had a button in a comb (White) The button was on the comb	I had a button in a comb The button was on the comb
Standard Sentences:	The button fell on the comb	The button fell on the comb

Table 2

Mean Number of Correct Responses
as a Function of Status, Condition, and Trial

Black Ss

	L	R	SS	FG	SG	F W	F B	S W	S B
T1	6.33	4.92	14.25	13.67	12.50	8.08	12.33	9.25	12.58
T2	10.92	10.67	21.17	16.33	18.58	13.67	19.25	15.25	18.42
M	17.25	15.59	35.47	30.00	31.08	21.75	31.58	24.50	31.00

White Ss

	L	R	SS	FG	SG	F W	F B	S W	S B
T1	9.92	6.17	16.00	18.33	17.83	15.58	14.08	15.00	14.75
T2	16.50	12.08	23.25	25.92	25.67	23.58	21.92	23.75	24.00
M	26.42	18.25	39.25	44.25	43.50	39.16	36.00	38.75	38.75

L - Listen
R - Rehearsal
SS - Standard Sentence
FG - Free Generate
SG - Sentence Generate
F W - Free White
F B - Free Black
S W - Sentence White
S B - Sentence Black

MSE Provided Effects (44) = 69.45
MSE All Conditions (198)= 121.74

Table 3

Analysis of Variance Table:
Sets of Sentences Blocked for Provided Conditions

Source	df	F	P
String Type	1	1.00	N.S.
Population Origin w. Type			
PO/Free	1	1.92	N.S.
PO/Sentence	1	2.70	N.S.
Population Recipient w. Type			
PR/Free	1	20.59	**
PR/Sentence	1	23.69	**
Pop. Origin X Pop. Recipient w. Type			
POxPR/Free	1	7.30	**
POxPR/Sentence	1	1.11	N.S.
Sets of Strings w. Origin x Type	44	1.04	N.S.

MSE (44) = 69.45

* $p < .05$

** $p < .01$

Table 4

Mean number of category items
as a function of Conditions, Population and Source

		Category								
Condition	Source	N1 vb N2	N2 vs N1	DO_1-OP_2	DO_2-OP_1	CO_1-2	CO_2-1	Misc.	Activity of Verb	No. of Diff. Constructions
Free	White	18.17	5.17	4.83	4.42	2.08	.92	.42	19.75	5.67
	Black	9.33	2.92	6.58	6.25	2.00	.25	8.58	22.58	6.25
	Mean	13.75	4.04	5.73	5.33	2.04	.58	4.50	21.17	6.06
Sentence	White	18.41	4.67	4.92	4.50	2.08	.41	1.00	21.00	5.67
	Black	10.33	3.25	8.83	7.16	2.83	2.00	1.58	26.00	6.58
	Mean	14.38	3.96	6.88	5.83	2.46	1.20	1.31	23.50	6.12